

REMARKS

Claims 1-32 have been examined and stand rejected. By the above amendments, claims 1, 6, 8, 17, 20, and 24 have been amended, and new claims 33 and 34 have been added. Accordingly, claims 1-34 now are pending in the subject application. Favorable reconsideration of the application and allowance of all of the pending claims are respectfully requested in view of the above amendments and the following remarks.

Claims 1-32 stand rejected under 35 U.S.C. §102(b) based on public use or sale of the invention. Applicant respectfully traverses this rejection.

The Examiner argues that Applicant admitted in the Rule 131 Declaration filed on May 2, 2007 that the invention was in public use prior to October 24, 2002, more than one year prior to the application filing date. This statement is incorrect. Neither the Declaration nor the supporting documentation makes any mention or reference to any public use of the invention at all. There is simply nothing in the Declaration that relates to public use in any way. The Declaration merely explains that the invention was made (conceived and reduced to practice) prior to October 24, 2002. How such a statement can be construed as an admission of public use is not understood. In any event, if the Examiner disagrees, the Examiner is respectfully requested to point out the specific passage(s) which refers to public use in the Declaration.

Claims 1-11, 16-26, and 29-32 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Publication No. 2002/0136276 to Franceschini et al. in view of U.S. Patent No. 6,175,551 to Awater et al. Further, dependent claims 12-15, 27, and 28 stand rejected as being unpatentable over Franceschini and Awater in view of U.S. Patent No. 5,263,048 to Wade. Claims 1-11, 16-26, and 29-32 stand rejected as being unpatentable over U.S. Patent Publication No. 2002/0172213 to Laroia et al. in view of U.S. Patent No. 6,668,008 to Panasik. Further, dependent claims 12-15, 27, and 28 stand rejected as being unpatentable over Laroia and Panasik in view of Wade. Applicant respectfully traverses these rejections insofar as they apply to the amended claims.

As explained throughout Applicant's specification, an important principal of the present invention is that a wide bandwidth signal can be transmitted under circumstances where a continuous wide band is unavailable. As explained on page 1, beginning on line 19, "Position accuracy is inversely proportional to bandwidth and the square root of the signal-to-noise ratio (SNR). A good strategy to improve position accuracy is to increase both bandwidth and SNR. Ideally, increasing bandwidth is the best way to improve accuracy because of the inverse square root relationship of improved accuracy with increasing SNR." As further explained on page 2, line 2, "an object of the present invention is to enable a wide bandwidth signal to be transmitted using plural, non-contiguous frequency bands." Similarly, beginning on page 3, line 8, "the non-contiguous spectrum selection technique can be implemented in a transmitter that transmits data communication signals or navigation signals, and permits use of plural, non-contiguous frequency bands to transmit a wide bandwidth signals that cannot be transmitted in a continuous frequency band due to constraints in the allocated frequency spectrum available for transmission.

Inherently, the wideband signal described in Applicant's specification is not a series of multiplexed, narrowband signals or a multi-carrier scheme but rather a single-carrier, wideband signal that spans across all the frequency bands being used for transmission. This is evident, for example, from the passage beginning on page 4, line 31, which reads "The resulting non-contiguous frequency bands are then used collectively and simultaneously to transmit a wide bandwidth signal, such as a direct sequence spread spectrum signal, employing the collective bandwidth of the non-contiguous frequency bands." Note that only one wideband direct sequence spread spectrum signal (i.e., a single carrier) uses the collective bandwidth of the non-contiguous frequency bands and not multiple carriers on a set of narrow sub-bands. Again, this broad bandwidth is important to achieve high signal fidelity for applications such as time-of-arrival determination.

The fact that the total bandwidth is allocated to a single-carrier signal is further evident from the fact that excision of portions of the signal bandwidth impacts the pulse shape of the resulting signal. As explained on page 9, line 25, "Importantly, system performance is a function of the total bandwidth and is relatively insensitive to whether the bandwidth is available in a

continuous band or is achieved by summing the bandwidth of two or more non-contiguous frequency bands. Thus, the frequency spectrum of the transmitted signal can be non-contiguous and broken up to an arbitrary extent provided the resulting combined bandwidth from the non-contiguous frequency bands meets the bandwidth requirements of the system. Removal of portions of the signal spectrum does impact the shape of the resulting pulse, since certain frequency components have been removed.” Likewise, on page 10, line 3, it is explained that “the bandwidth of the frequency-domain signal generated by the FFT should span the overall band that includes all of the non-contiguous frequency bands used for transmission, from the lowest frequency of the lowest band to the highest frequency of the highest band. Thus, the time-domain signal and FFT parameters must be selected accordingly.” The exemplary waveform parameters provided on page 10 of the specification inherently and unambiguously relate to a single-carrier signal that spans the band which includes the non-contiguous frequency bands used for transmission rather than multiple, narrowband sub-band carriers.

One of the effects of having such a single-carrier wideband signal is explained on page 12, line 29: “A narrowband interferer typically covers one or a few frequency bins. With a spread spectrum signal having a relatively wide bandwidth spanning hundreds or thousands of frequency bins, the receiver can afford to lose the small portion of the overall signal corresponding to the narrowband interference without substantial degradation to detection of the spread spectrum signal.”

With the foregoing in mind, claims 1 and 20 have been amended to clarify that the signal being transmitted is a single-carrier wideband signal. More particularly, the independent claims now require that “the excised time-domain signal is a single-carrier wideband signal having a bandwidth comprising a collective bandwidth of the non-contiguous frequency bands used for transmission.”

The primary references Franceschini and Laroia relied upon by the Examiner relate to Orthogonal Frequency-Division Multiplexing (OFDM) schemes. OFDM is a digital multi-carrier modulation scheme that employs a large number of orthogonal sub-carriers. Each sub-carrier is separately modulated with some conventional modulation scheme at a relatively low

symbol rate, such that the overall set of sub-carriers achieves a data rate similar to a conventional single-carrier modulation scheme which uses the same overall bandwidth. This is explained, for example, in paragraph [0006] of Franceschini. As explained in paragraphs [0023] and [0025], the frequency division - sequence spectrum spreading (FD-DSS) scheme used by Franceschini is a variant of OFDM, which nevertheless still involves a large number of sub-bands, each of which corresponds to a narrowband carrier. Franceschini's preferred embodiment, for example, uses 1024 independent carriers (see paragraphs [0029-31]). Likewise, Laroia's disclosure relates to a scheme for reducing the peak-to-average power ratio in an OFDM communication signal (as explained in previous responses, this is the same problem addressed by Awater, now relied upon as a secondary reference). To the extent that excision is applicable to these systems, the excision involves eliminating some number of sub-band carriers or simply providing gaps between the frequency bands used to transmit the sub-band carriers rather than removing a portion of the spectrum of a wideband signal.

In contrast to the multi-carrier nature of the OFDM schemes described in the primary references, independent claims 1 and 20 require a single-carrier wideband signal having a bandwidth comprising a collective bandwidth of the non-contiguous frequency bands used for transmission. Since the OFDM schemes of the Franceschini and Laroia inherently involve frequency excision in the context of a multi-carrier modulation scheme involving narrowband sub-carriers, these references do not disclose or suggest excising a portion of a frequency domain signal of a single-carrier wideband signal having a bandwidth comprising a collective bandwidth of the non-contiguous frequency bands used for transmission, as required by Applicant's claims. Moreover, even if the systems of Franceschini and Laroia were to be modified in view of Awater, Panasik, and/or Wade, these systems would still fundamentally involve OFDM schemes. Thus, no combination of the cited references would have rendered obvious the subject matter of independent claims 1 and 20 and their dependent claims. Accordingly, in view of the clarifying amendments, the Examiner is respectfully requested to reconsider and withdraw the rejections of claims 1-32.

New claims 33 (33/1) and 34/20) recite that the pulse shape of the single-carrier wideband signal is changed by excision of the portion of the frequency-domain signal. Support is found in Applicant's specification for the subject matter of these claims as described above. These claims are patentable over the prior art of record for at least the reasons provided above by virtue of their dependence on the independent claims.

In view of the foregoing, Applicant respectfully requests the Examiner to find the application to be in condition for allowance with claims 1-34. However, if for any reason the Examiner feels that the application is not now in condition for allowance, the Examiner is respectfully requested to call the undersigned attorney to discuss any unresolved issues and to expedite the disposition of the application.

Filed concurrently herewith is a Petition (with payment) for an Extension of Time of One Month. Filed concurrently herewith is an excess claim fee in the amount of \$100 for payment of 2 total claims in excess of the 32 previously paid for. Applicant hereby petitions for any extension of time that may be necessary to maintain the pendency of this application. The Commissioner is hereby authorized to charge payment of any additional fees required for the above-identified application or credit any overpayment to Deposit Account No. 05-0460.

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